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I, JANENE PEISKER, TEAM LEADER EXAMINATION SUPPORT AND SALES hereby certify that annexed is a true copy of the Provisional specification in connection with Application No. 2004904453 for a patent by FRANK DANIEL LOTRIONTE as filed on 10 August 2004.

COMMONWEALTH OF AUSTRALIA
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Fourteenth day of April 2005

JANENE PEISKER
TEAM LEADER EXAMINATION
SUPPORT AND SALES

AUSTRALIA
Patents act 1990

COMPLETE SPECIFICATION
PROVISIONAL PATENT

LOTRIONTE " Z " TURBINE

The following statement is a full description of this invention , including the best method of performing it known to me :

LOTRIONTE " Z " TURBINE

Technical category : Mechanical , electrical.

On most part , turbines have consisted of large machines that do not utilise all of the potential energy of the surrounding wind or gas / fluid flow, or need a relatively high wind speed to achieve their rated power outputs and have little appeal and usefulness to the potential wind energy users situated in low to moderate annual wind speeds and are not always suitable for low / medium velocity ducted gas / fluid turbines.

This invention seeks to provide an increase in the efficiency of any wind , water ,steam , gas turbines that have a rotation axis parallel to fluid flow , of any given number of blades and / or diameter by the incorporation of a unique blade design that combines frontward protruding elongated blade tips that form an artificial " duct " or low pressure vortex facing the gas / fluid flow drawing flow inwards without relying on the need for exterior stationary ductwork or funnels.
Also, as the blade design is balanced (both in weight distribution and twisting forces about its central mounting point on a hub or shaft , there is no need for a stiffening / directing annular rim attached to the perimeter or midsection of the blades , which greatly aids manufacturability whilst still retaining the ability to operate at high rotating speeds.

This turbine design seeks to concentrate the bulk of airflow reaction or " lift " at its outer extremeties of the blades and vanes as the greatest torque is produced when the deflective force acts upon the maximum distance from the axis of rotation.

Secondly , as the exitting gas / fluid flow area is made up of the "artificial periphal duct" area outside the rotating turbine plus the turbine rear diameter area , and the intake area is only equal to the turbine frontal diameter , this inequality in flow areas creates a lower pressure within the turbine that increases the velocity of gas / fluid flowing into and through it , past the blades / vanes.
Also , as the surrounding wind flows past the outside of the rotating blades , it provides an additional increase in the pressure drop within the turbine further increasing the interior gas / fluid flow velocity and the total working area of the turbine without raising its total maximum diameter and makes this design especially suitable and effective when the overall size is limited by space constraints.

DESCRIPTION

A plurality of curved section , outwardly extending blades # 3 ,that have a slight rearward " tilt " or vector which is balanced by attaching a slightly pointed , curved section (see figure 4) frontward protruding vane # 1 on their respective outer ends , all being twisted in a suitable helix or " attack" angle # 7 in relation to gas or fluid flow, are rotatably displaced around a hub or shaft # 4 with an axis parallel to incoming gas / fluid direction.
Narrow slots # 5 with a slightly radiused rear edge may be positioned generally perpendicular to the gas / fluid flow past the blade at that point to aid balancing the twisting due to " lift " or deflection forces of a pronounced " frontwardly " protruding vane.
This " turbine " may be connected to a generator, pumping system , power take off shaft or directly coupled to an axial compressor such as in a gas turbine arrangement.

The turbine is generally constructed in such a way as to allow for easy cavity mouldability or casting or forming in rigid plastics ,composites , alloys or steel sheet in the fabricated assembled or formed methods.

The claims defining the invention are as follows :

1.
A fan or impellor that consists of a plurality of outwardly extending curved " aero -foil " section blades # 3 that may contain a rearward tilt, and each having a slightly pointed substansially frontwardly projecting extension of pronounced length , #1 (hereby called a vane), seamlessly joined to their respective outer frontward extremities with a smooth curved blending , that are all rotabably connected on their innermost ends to a hub or shaft with an axis parallel to incoming gas / fluid flow.

2.
A fan or impellor with its blade / vane " arms" as claimed in claim 1 oriented somewhere between 20 - 70 degrees from the rotation axis # 7 when viewed from the top with the vane section #1 , having a slightly lesser angle of incedence and its inner leading edge converging toward the rear at an angle # 6 of between 20 - 70 degrees from the axis of rotation.

2.
A fan or impellor with the said blade/ vane arms as in claim 1 radially displaced around a hub or shaft either in a p anently fixed position , or able to be articulated about the central mounting point line # 8 to adjust the angle of inced e #7 to outside the definition as claimed in claim 2 to allow for its reduction to such an extent as to facilitate speed limiting when the maximum design speed has been reached in gale force winds or abnormal gas / fluid velocity .

4.
A fan or impellor as claimed in claim 1 with " arms " that may contain there in , " slots" # 5 that have at their respective rearward edges a small radius to lessen turbulence , and are generally oriented and positioned perpendicular to the wind / gas fluid flow at that point on the " arm"

5.
A fan or impellor as claimed in claim 1 that has leading (towards airflow at that point) edges of the blades , vanes and slot edges contained within the vanes and /or blades, rounded with an elliptical radius to reduce turbulence or wind drag.

6.
A fan or impellor as claimed in claim 1 that has the bulk of it " arms " mass centroid # 10 situated at between 0.3 - 0.42 of the diameter from the axis of rotation.

7.
A fan or impellor as claimed in claims 1 thru to 5 that is moulded or formed in rigid plastics , composites or cast , forged , pressed or fabricated from sheet metal , steel or aluminium , alloys , either as one unit or as assembled from individual components by riveting , bolting , welding , or otherwise joined.

8
A fan or impellor that may be used in an inline axial multy - turbine arrangement .
see alternative embodiment Figure 6 (a).

9.
A fan or impellor as herein before described with references to Figures 1 - 7 of the accompaning drawings.

Frank Daniel Lotrionte 6 - 8 - 2004

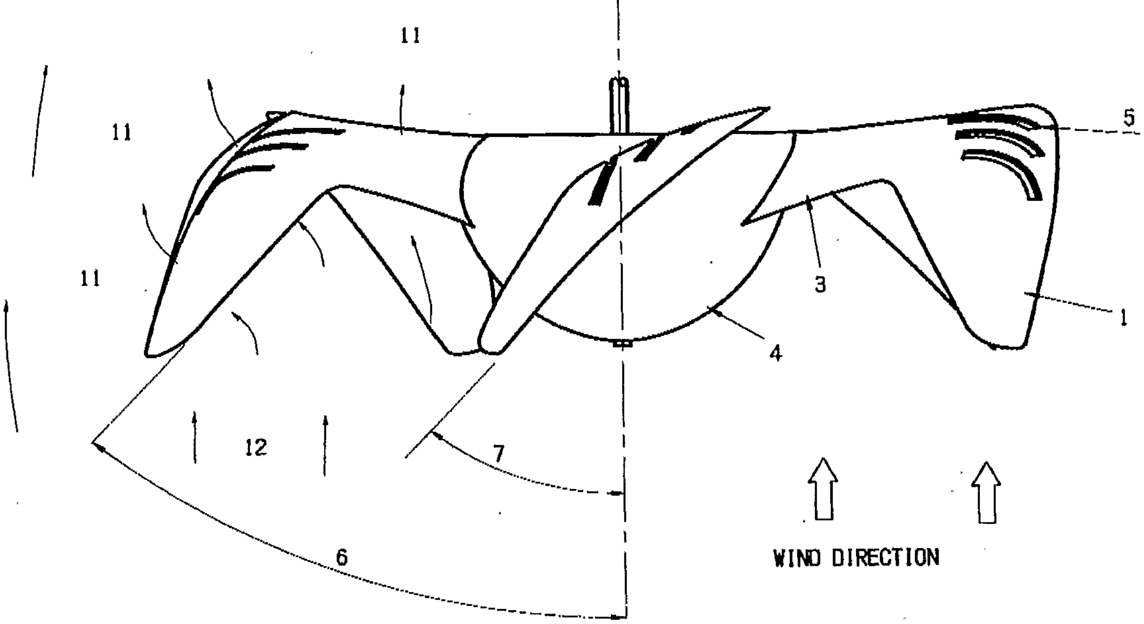
ABSTRACT

This turbine consists of a plurality of "arms" that contain there-in 2 differing sections Blades # 3 and Vanes # 1 , seamlessly joined together in an effort to locate the bulk of the working area of the whole rotating " arm " towards the outer extremeties where they can provide the best power efficiency in any given gas / fluid flow conditions , radially arranged around a central hub or shaft which is has its axis parallel to the incoming flow direction. These sections consist of an outwardly extending curved blade # 3 , that may have a slight rearward " tilt " or slant which " balances " a substansial , pointed curved section vane #1 protruding substansially frontward from its respective outer frontward edges in a smoothly blended curve.

The complete " arms " are oriented mainly forward , with a decreasing overall diameter toward their rear and set at a helix angle or " attack" angle # 7 in relation to gas or fluid flow, and have the "vane" section reducing in width towards the front, ending in a smoothly curved point to reduce disruption to incoming flow.
Because the exitting gas / fluid flow area # 11 is much larger than the incoming turbine flow area #12 ; there is a pressure drop within the turbine that increases the velocity of gas / fluid past the leading edges of the working areas of the blades/ vanes / slots that make up the " arms ," and the whole unit functions more effectively than either "Bladed" or " Vaned " turbines of typical contempory design .

This " turbine " may be connected to a generator, pumping system , power take off shaft or directly coupled to an axial compressor such as in a gas turbine arrangement.

FIGURE 1
(TOP VIEW)



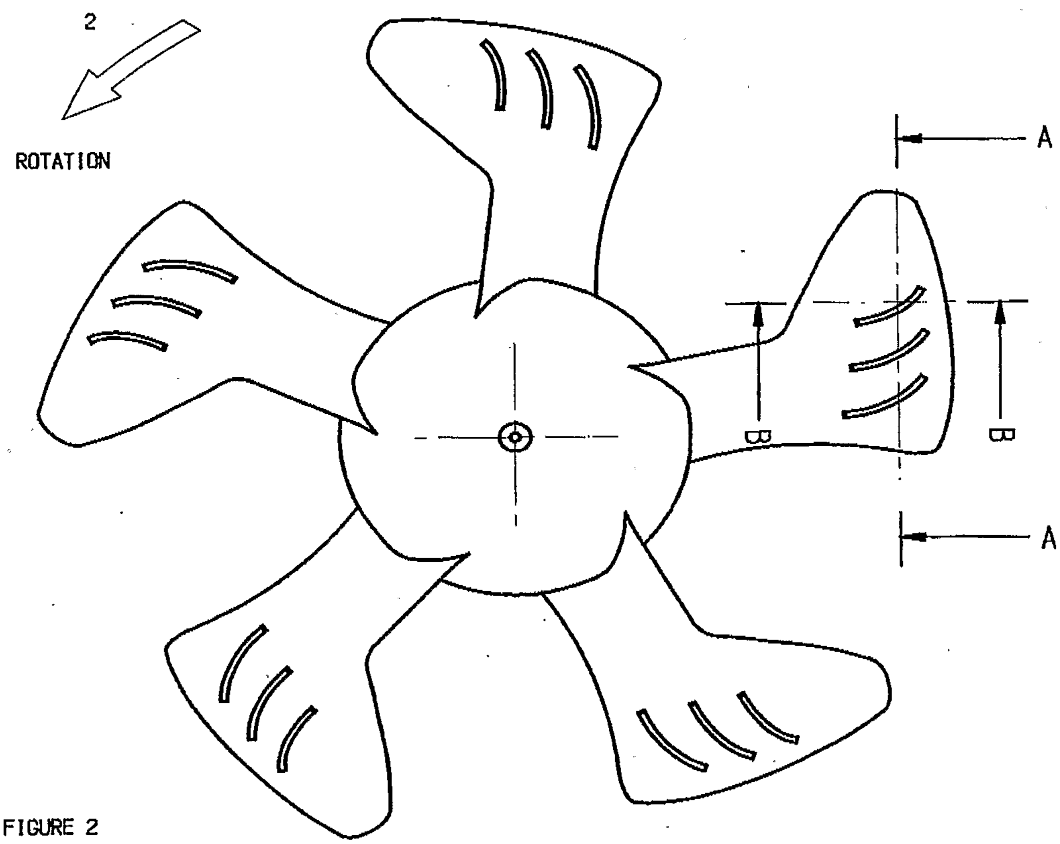


FIGURE 2
(FRONT VIEW)

FIGURE 3
(Section A -A)

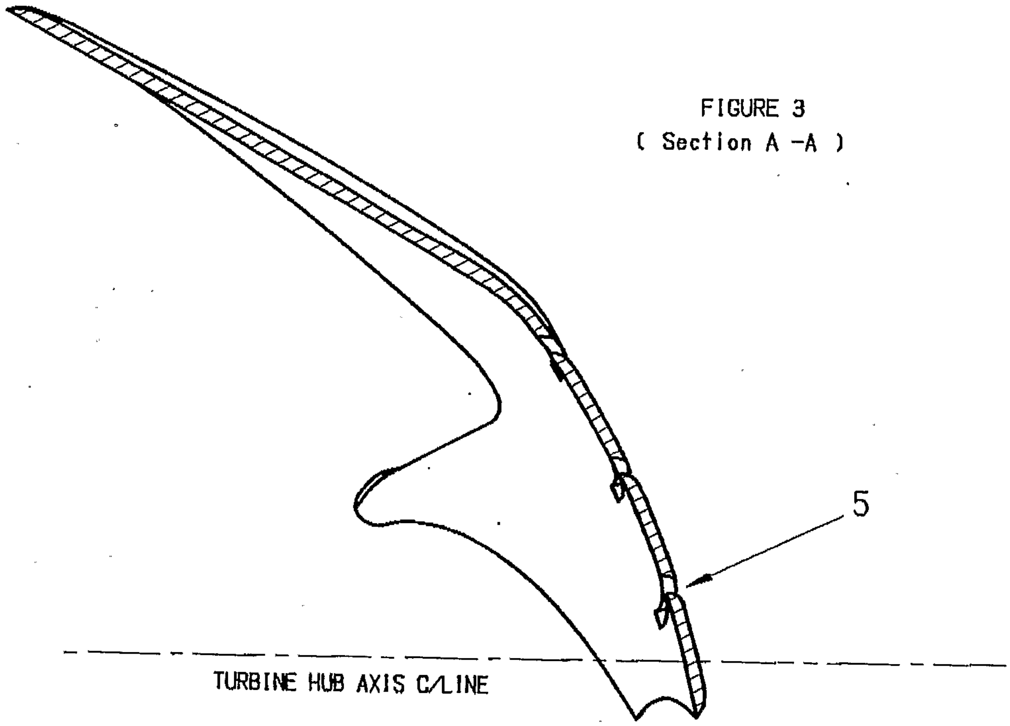
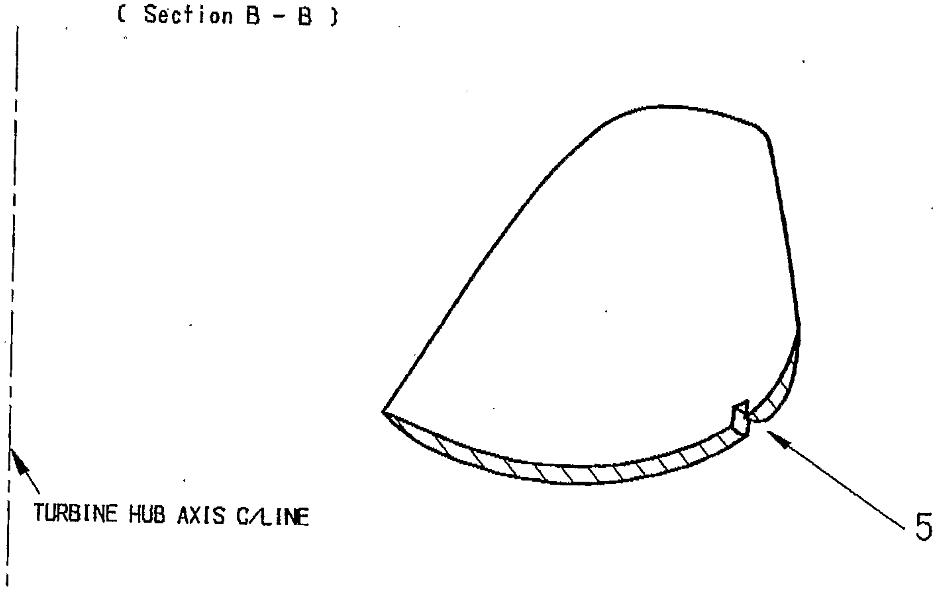


FIGURE 4
(Section B - B)



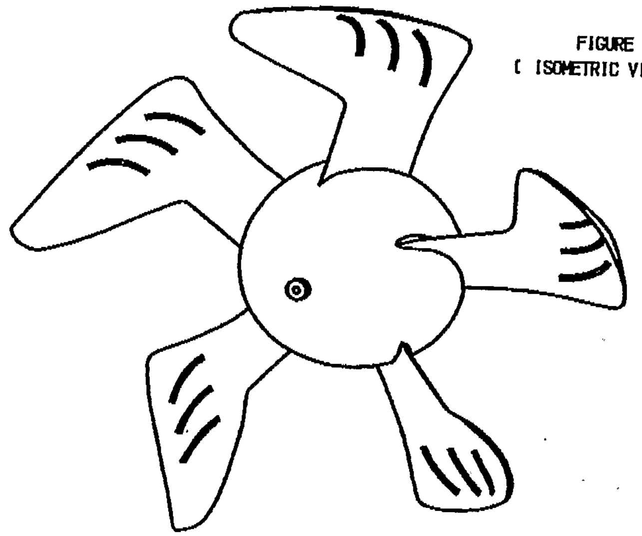
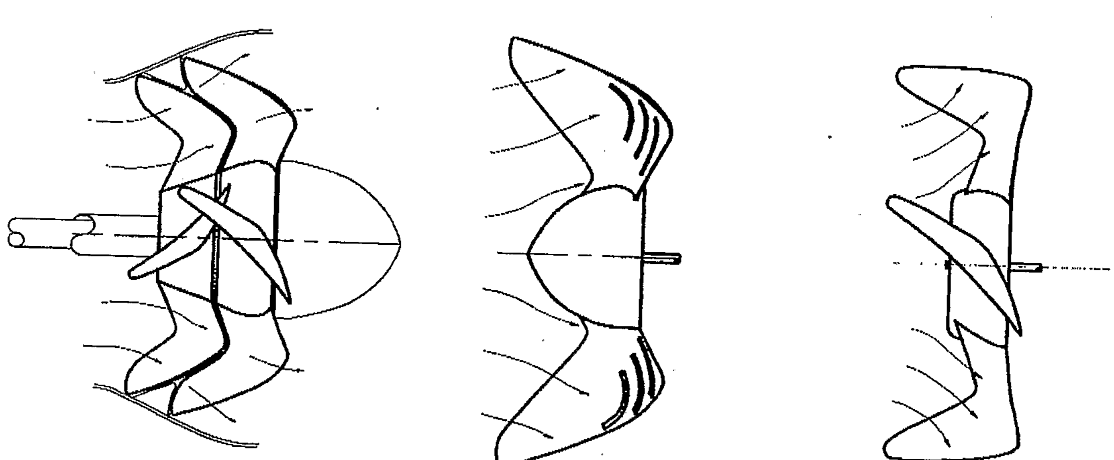


FIGURE 5
(ISOMETRIC VIEW)

FIGURE 6
(ALTERNATIVE EMBODIMENTS)
SIDE VIEW

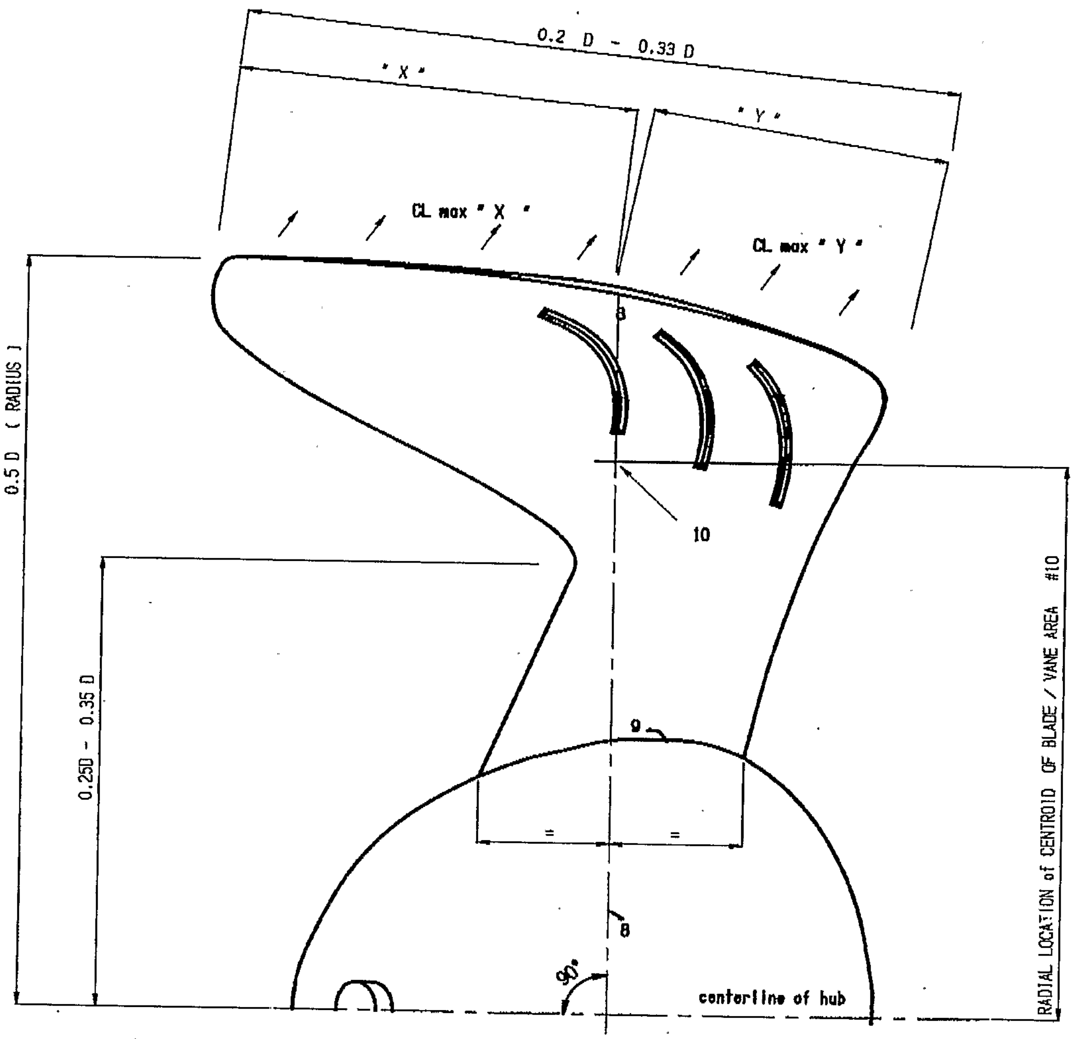


Alt. embodiment " a "
multistage inline
turbine configuration

Alt. embodiment " b "
suitable for high wind
or fast rotational speed

Alt. embodiment " c "
No slots - suitable for manufacturing
in in formed sheet metals or plastics

FIGURE 7 (face-on view of vane)
(DEFINITION OF BLADE /VANE DIMENSIONS AND FORCES



If a line # 8, were drawn through the center of the area # 9, that joins the hub with the blade ,and perpendicular to the centerline of the hub , and that line were extended outwouldly to the vane edge , it would be found that the the mass of the blade / vanes on either side " X" AND "Y" would be approximately equal to reduce undue moment forces upon the junction area # 9.
Furthermore , the tangential "lift " forces due to air flow on either side of line # 8 (CL max "X " by length "X ") and (CLmax " Y " by length " Y " is also approximately equal . This means that the whole "arm" can be completey balanced and not subject to any undue twisting forces .
It has been found that by positioning the bulk of the blade / vane area centroid at approximately 0.3 - 0.42 diameter # 10 , close to the maximum power output per turbine unit area is acheived.

Where D = diameter
CL max = lift co-efficient for aerofoil section